Testing Gas Appliances

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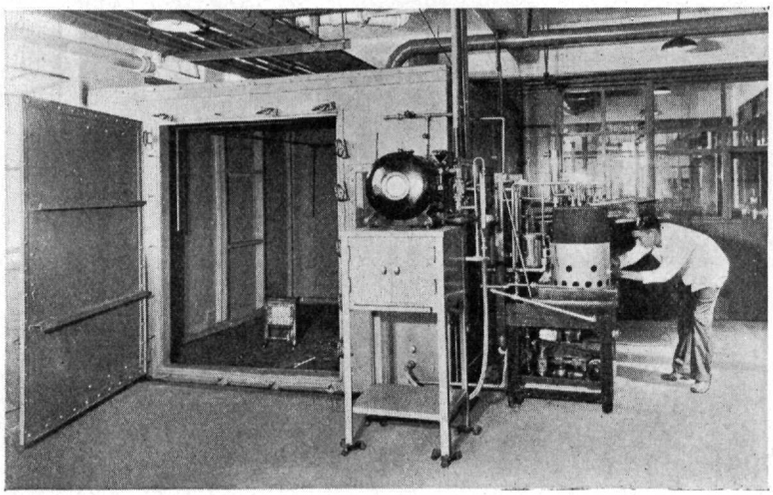
A.G.A. approved—a mark of distinction in the commercial world. Any gas appliance that receives this stamp of approval must undergo a series of rigorous tests at the American Gas Association Testing Laboratory in Cleveland or Los Angeles. Extremely high standards, prepared by committees representing the U. S. Bureau of Standards, U. S. Bureau of Mines, U. S. Public Health Service, U. S. Department of Agriculture, Bureau of Home Economics, American Home Economics Association, National Association of Heating and Piping Contractors, Master Plumbers' Association, the Canadian Gas Association, Underwriters' Laboratories, gas companies and manufacturers of gas appliances, are maintained to insure Mr. Public of safe equipment which gives satisfactory service. In this day of keen competition, the approval greatly contributes to the advance of the industry.

It was our privilege last summer to make an inspection trip through this modern laboratory in Cleveland. Plans were completed in 1924 for the construction of a national testing laboratory. Since this time more than 21,000 gas appliances have been tested and certified. A great amount of research is also carried on in the laboratory. During the past year more than forty-six separate investigations in the development of and revision to requirements for gas appliances were completed.

Within the building are several manufacturer's rooms. Here, the manufacturer can carry on his research, with the cooperation of the laboratory, on improvements of his products. A complete library is also housed in the laboratory and a large office force and research staff is maintained. One of the main parts of the building is a complete chemical laboratory. Here is located the most modern equipment for gas analysis.

It is in this chemical laboratory that samples of combustion from the various burners, stoves, and furnaces are analyzed. This room contains I_2O_5 machines that determine amount of CO in the products of combustion within an accuracy of .002 of 1%. For this determination the CO is oxidized by I_2O_5 at a temperature of about 300°F. The liberated iodine is absorbed by a KI solution and the resulting solution is then titrated with Na_2SO_3 using starch as an indicator. Other apparatus consists of various types of calorimeters, specific gravity balance, and gas analysis apparatus such as the Orsat and Haldene.



Air Tight Room and Automatic CO Recorder

Suppose we follow a portion of the trip that the ordinary radiant gas heater would take through the laboratory. It arrives from the manufacturer and is taken to the receiving rooms. Here it is unpacked and both the heater and the crate are labeled with the manufacturer's name. The crate is then set aside until the tests are completed.

Perhaps the first test given to the heater is that for the detection of CO in the products of combustion. The heater is placed in an air tight room of a 1,000 cu. ft. capacity. In this room the heater is permitted to burn a definite quantity of gas which reduces the O_2 content. A portion of the products of

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combustion is continually drawn from this air tight room into an instrument containing a mixture of copper oxide and MnO_2. The CO is oxidized, liberating heat which acts on thermocouples present. The per cent of CO is then automatically recorded by a potentiometer. The apparatus can detect CO in such small amounts as one part in 100,000.

After this test the heater may be taken to a room for a fire hazard test. Here it is placed on a platform which has two walls about it. Small holes are drilled through the wall into which thermometers are placed. The heater is then ignited and the temperatures are recorded.

From here we follow it to the radiant efficiency test. A device known as the thermopile is used for this test. The heater is placed at the center of an imaginary hemisphere, which has a two foot radius, and the thermopile is rotated over the surface of the hemisphere. The heat detected is also recorded by a potentiometer. These are just a few of the many tests an appliance undergoes. A gas range, for example, must pass 160 separate tests before it receives the stamp of approval.

The laboratory itself carries on numerous investigations. One that has recently been completed is the study of mixed gases. This research has been carried on for the past five years during which time over 250 different gas mixtures were studied. Determinations were made on the possible limits in blending gases for appliance performance and the resulting specific gravity, heating value and chemical composition.

Another problem that has been studied is that of the

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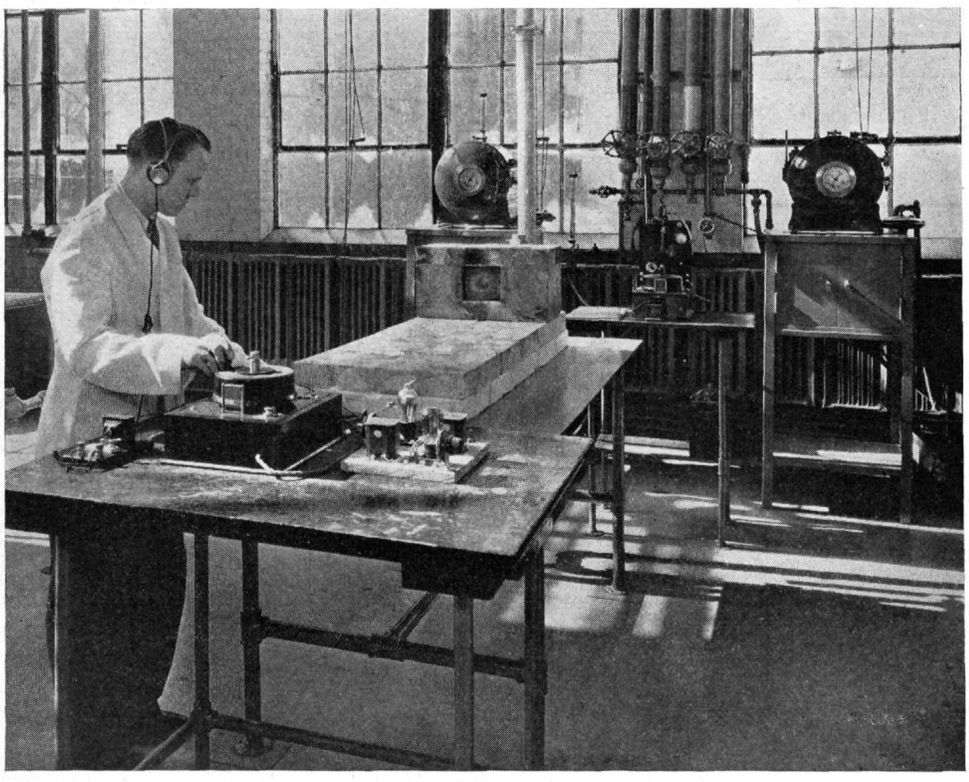

—Cuts Courtesy A. G. A.

Measuring Noise Produced by Gas Burners

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elimination of noise from large gas burners. It was found that the noise produced is directly proportional to the ignition velocity of the gas. This depends upon the chemical composition. It was found that natural gas is less noisy than coke oven gas. Numerous instruments were used to determine the intensity of noise produced by the burners.

An interesting project in progress last summer was the determination of the wear on various types of gas cocks. These valves were opened and closed by an electric motor, shaft and eccentric. The movements were clocked and the entire apparatus was heated to a temperature common to the valves on the ordinary gas range. After a definite number of operations the valves were tested and the leakage effects were determined.

One section of the laboratory is used for the testing of flexible tubing. Here torsion, tension, shock, and heat is applied to the tubing and the tubing is tested for leakage after every test. In another section of the building pipe joints are tested. The laboratory also uses in collaboration the facilities of the testing laboratories at Case School of Applied Science in Cleveland and of the University of Pennsylvania.

Just outside of the building stand four 5000 cu. ft. gas holders. Each one of the four holders contain a different kind of gas:—water, natural, coke oven, and mixed. This enables the laboratory to test appliances under practically every existing condition of a city's gas supply.